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ABSTRACT

The effect of reduced reimbursements by the federal government for indirect research costs was analyzed for the typical academic medical center. The effects of simply cutting indirect cost reimbursement were contrasted with the impact of securing compensating levels of increased direct project support. To determine if the consequences differed as a function of the financial strength of the university, these scenarios were examined in two academic medical center environments. One setting was a fiscally sound operation with adequate income streams to maintain plant and equipment, and to achieve modest program and operational growth. The other setting did not have adequate income streams and was undergoing a long-term, moderate retrenchment. The objective of the comparison of the two settings was to determine if the impact of proposed federal policies would vary depending on the fiscal soundness of the affected institution. Significant negative multiplier effects were observed due to the required diversion of institutional funds. It was concluded that the simulated behavior patterns were indicative of those that any research-oriented university would experience. (SW)

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THE ASSOCIATION FOR INSTITUTIONAL RESEARCH

This paper was presented at the Twenty-Fourth Annual Forum of the Association for Institutional Research held at the Hyatt-Regency in Fort Worth, Texas, May 6-9, 1984. This paper was reviewed by the AIR Forum Publications Committee and was judged to be of high quality and of interest to others concerned with the research of higher education. It has therefore been selected to be included in the ERIC Collection of Forum papers.

Daniel R. Coleman, Chairman
Forum Publication
Advisory Committee

THE ECONOMICS OF DIRECT VERSUS INDIRECT COST RECOVERY IN SPONSORED RESEARCH

Abstract

Controversy over the level of indirect cost reimbursement associated with federally funded research projects has been prominent recently both in the literature and in Washington. With increasing federal budget pressures, one recurring proposal to cut costs and sustain direct project support is to reduce indirect cost reimbursement. Using a systems simulation model, the long-term economic impacts of such changes are analyzed for an academic medical center. Significant negative multiplier effects are observed due to the required diversion of institutional funds. The authors contend that the simulated behavior patterns are indicative of those which any research oriented university would experience.

Background

A vigorous debate has been waged in recent years over the appropriateness of federal agencies requiring that host institutions bear a greater share of the costs of federally sponsored research projects. This controversy has been motivated by federal deficits and resultant budget reductions and restraints on agencies such as the National Institutes of Health (NIH) and the National Science Foundation (NSF) which fund substantial research in colleges and universities in the United States.

Arnow (1983), in a particularly insightful paper published in Science, details in both chart and narrative form the flows of benefits between the various constituents involved in federally funded, university based research. She includes in this analysis the relevant federal agency, the recipient (host) university, the faculty scientist conducting the research, that scientist's discipline community, and the general public.

Arnow makes the point that under present federal policies, universities hosting federally sponsored research make substantial contributions toward the cost of such research in the form of:

1.) Federally required cost sharing;

2.) Unallowable (by the federal agency) indirect costs;

3.) Pre- and post-grant support of the project;

4.) Provision of a base of continuing employment (possibly including tenure) for the faculty investigator; and

5.) Provision of the necessary environment, management skills, and accountability to make it possible for the research effort to proceed.

In turn, the university receives recognition as a highly competent research center, heightened academic standing, and the enhanced services of the faculty member as a teacher and stimulus to other faculty and students.

Within this backdrop of philosophical issues, but in response to the problem cited in the first paragraph, arguments are being made to reduce the portion of indirect costs covered by federal agencies to save federal dollars or to increase the funds available for direct research program support. Indirect costs, in this instance, are expenses essential for the conduct of the federally sponsored research, but not directly charged to a grant. They are reimbursement for expenditures already made by universities for items such as utilities, plant maintenance, grants administration, and usage of buildings and equipment.

Brown (1981) points out that "indirect costs have increased steadily and markedly since 1966, when the current indirect cost policy became effective. This is even the case when indirect costs are expressed as a percentage of total direct costs" (p. 411). Brown's data indicate that funding of direct expenses as a percent of total extramural research funding dropped from 87.7% in 1966 to 73.3% in 1979. Although acknowledging that "Reimbursement of some major portion of indirect costs is . . . a necessary aspect of a desirably high level of federally supported research" (p. 415), and that "Research should be optimally supported . . . without imposing unnecessary financial or administrative burdens on the universities" (p. 411), Brown feels that the goal of optimally supporting research "is being compromised by the high indirect costs that now pertain at many universities" (p. 411). He states that "The amount of research that can be supported with any total level of federal funding has thus been seriously reduced, and this has become a major factor limiting the support of research in this country" (p. 411).

In a similar, but more critical tone, the Federation of American Societies for Experimental Biology Newsletter ("Indirect Cost, an Entitlement Program", 1982) states, "Over the past decade no aspect of the biomedical research enterprise has engendered as much growing concern as the constantly growing percentage of dollars appropriated for research which is required to satisfy the indirect cost claims of institutions where the research is performed" (p. 1).

The journal, Business Officer, in a review of sponsored program activity by its editorial staff ("Sponsored Programs", 1983), reports that a fiscal 1984 proposal by NIH to reduce indirect cost reimbursement would result in a loss to 25 major research universities of over $25 million.

Danforth (1982) specifically discussing an NIH proposal to reduce by 10 percent the amount that universities are reimbursed for indirect costs with the proviso that these liberated funds would be used to fund additional research grants, argues that "unfortunately, there is still no free lunch" (p. 371). He states that "On the surface a reduction in reimbursement for expenditures for indirect costs may seem desirable, since it gives the appearance of benefiting the overall national research effort by increasing funds for individual research grants" (p. 371). However, he goes on to say that "Costs would merely be transferred from the federal government to universities and, in my view, the national research effort would be weakened rather than strengthened. . . . The costs are not arguable. It is only a matter of who pays" (p. 371-372). Danforth's position is that the proposals boil down to simply asking the universities to contribute more to the national research effort. His answer, like Arnow's, is that universities have, and are, contributing a substantial amount now by building facilities, purchasing equipment, fielding a team of competent faculty and providing them stability of employment, tiding

researchers over interruptions in grant funding, and maintaining libraries. He contends that "Universities are already stretched financially to support this responsibility and their educational commitments in a time of austerity. There are few ways for them to respond to this shortfall without weakening the entire enterprise" (p. 372).

Purpose

The purpose of this paper is to test some of the contentions stated above, by analyzing the economic impact on a typical research oriented university academic medical center of reductions in the proportion of research associated indirect costs which are reimbursed by federal sponsoring agencies. The results are analyzed over time, and the effects of simply cutting indirect cost reimbursement are contrasted with the impact realized when the institution is able to secure compensating levels of increased direct project support.

To determine if the consequences differ as a function of the financial strength of the university, these scenarios are examined in two different academic medical center environments. One setting is a fiscally sound operation with adequate income streams to maintain plant and equipment, and to achieve modest program and operational growth. The other setting is one in which the institution's income streams are not quite adequate to maintain its starting level of programs, operations, facilities, and equipment. It is undergoing a long-term moderate retrenchment. The purpose of conducting the analyses within the two different settings is to determine if the impact of the proposed federal policies will vary depending on the fiscal soundness of the affected institution.

Methodology

The authors tested the scenarios described above by utilizing a simulation model implemented for policy analysis and comprehensive strategic planning at an academic medical center. The Medical Center Model (MCM) is designed to rigorously encompass all of the major components and programs of the academic medical center, including the medical school, primary teaching hospital, and medical practices of the faculty. Its structure, characteristics, and capabilities have been described previously (Kutina, Bruss, and Paich, 1982).

MCM consists of approximately 1800 equations and is formulated via an approach known as system dynamics (Richardson and Pugh, 1981), which grew out of the application of feedback control systems theory to dynamic socio-economic systems. This approach is particularly useful for investigating system behavior, that is, responses of a system to various stimuli over time. The simulated institutions used in this study are formulated based on data from the medical center at Case Western Reserve University School of Medicine which has about 900 full-time faculty, 600 medical students, 200 graduate students, and $30 million per year of research funding. The major teaching hospital has approximately 1000 beds, and 400 residents. The total combined annual budget of the School, Hospital, and faculty medical practice plans is approximately $180 million.

Although originally implemented for one particular university, the authors feel that the structure of the model is such that it is representative of any research oriented university academic medical center. Also, in the context in which the model is used in this paper, it is reasonable to assume

that the behavior patterns observed are quite indicative of those which would be experienced in nonmedical university settings as well.

For purposes of the study described in this paper, the income data in the original model were altered by the authors to create simulations of two reasonably well managed institutions, but with different financial underpinnings. As explained in the Purpose section, the first institution has adequate financial strength to fully maintain its plant and equipment and to provide startup funds to fuel modest, steady growth (labeled "Institution S" on the figures). The second institution was created with more marginal financial resources (labeled "Institution M" on the figures). It does not have sufficient funds to quite maintain its stock of facilities and equipment, and is in a gradual retrenchment mode. It is assumed that both schools have maximization of research output as one of their goals.

Figure 1 displays the base case simulated total revenues over time for the two institutions. Institution S registers a growth of 0.32% annually, while Institution M retrenches at an annual rate of 0.33%.

Insert Figure 1 about here

Results

Using the models described above, the institutions were first subjected to losses in indirect cost recovery income ranging from 5% to 20%, to evaluate the system behavior over varying levels of loss. The observed impact was essentially linear, indicating that one can assume that the effect of larger or smaller changes in indirect cost recovery from those analyzed in detail would simply vary in direct proportion to the size of the initial income change. For this reason, the remaining analyses were carried out utilizing only a projected

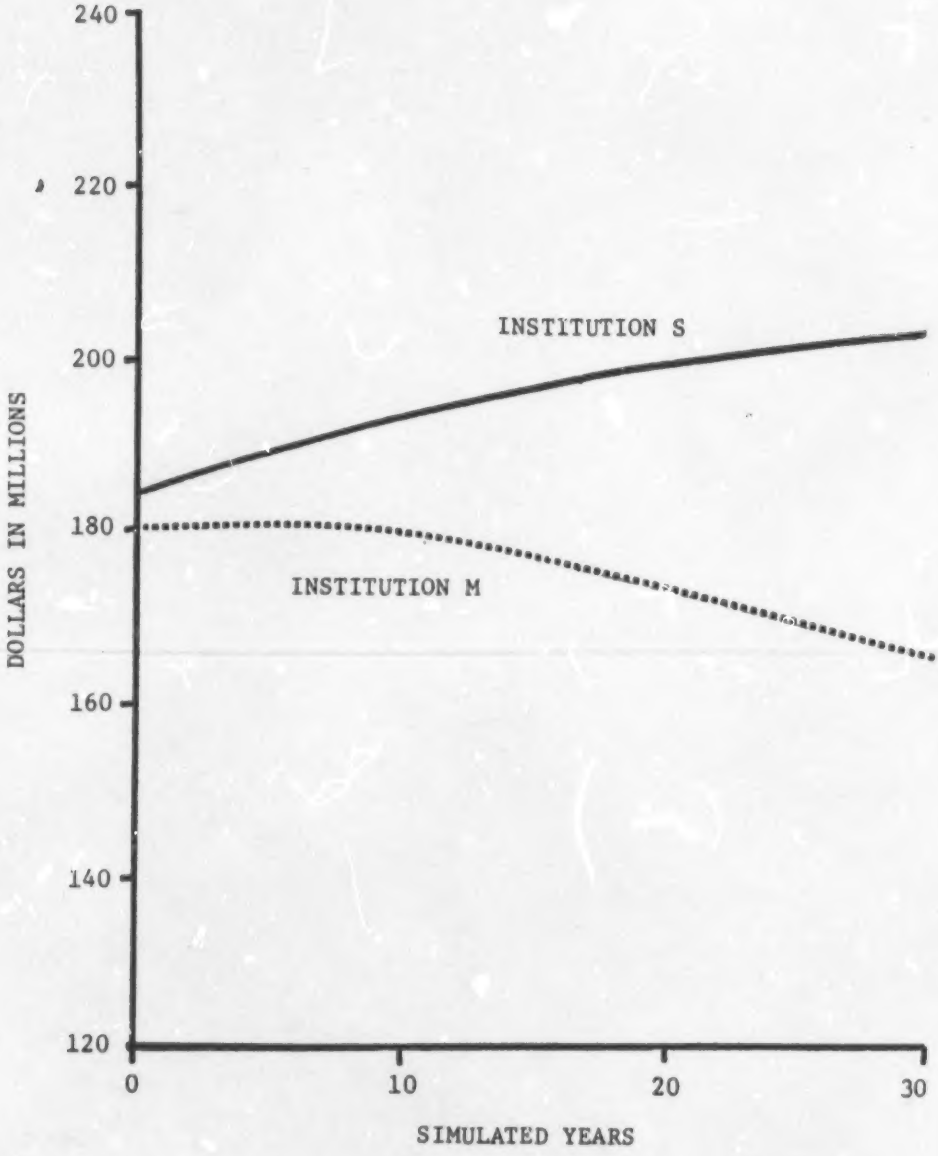

FIGURE 1. Simulated total revenue performance - base cases

loss of 10% in indirect cost recovery, which has been the reduction most prominently proposed.

Figure 2 shows the projected annual loss in total revenue over a 30 year period for the two simulated institutions as well as the loss in indirect cost reimbursement for Institution S. The latter reduction is very similar for Institution M. This graph dramatically displays the compounding impact of the loss in general revenue resulting from a reduction in indirect cost recovery. The initial loss is $632,000. Institution S eventually reaches a new steady state level, after a period of substantial retrenchment, indicated by a total revenue level about $2.5 million per year lower than its initial level. Institution M, starting in a more marginal financial position, suffers a still more severe loss, which stabilizes about $3.5 million in annual total revenues below its initial level.

Insert Figure 2 about here

The significant compounding effect that is observed over time, causing the eventual institutional shrinkage to be four to six times the initial annual income loss, is due to the fact that indirect cost recovery income is a component of a limited total pool of funds available for general institutional expense. These funds are used for fixed expenses such as plant maintenance, utilities, and library support, for variable expenses such as salaries of faculty and staff, and supplies, and for upgrading of buildings and equipment. When the total pool of general funds available for these expenses is reduced, the scale of the enterprise must shrink. Variable operating expenses must be reduced as rapidly as possible, and fewer dollars are available to renew depreciated plant and equipment. If an institution must function with fewer

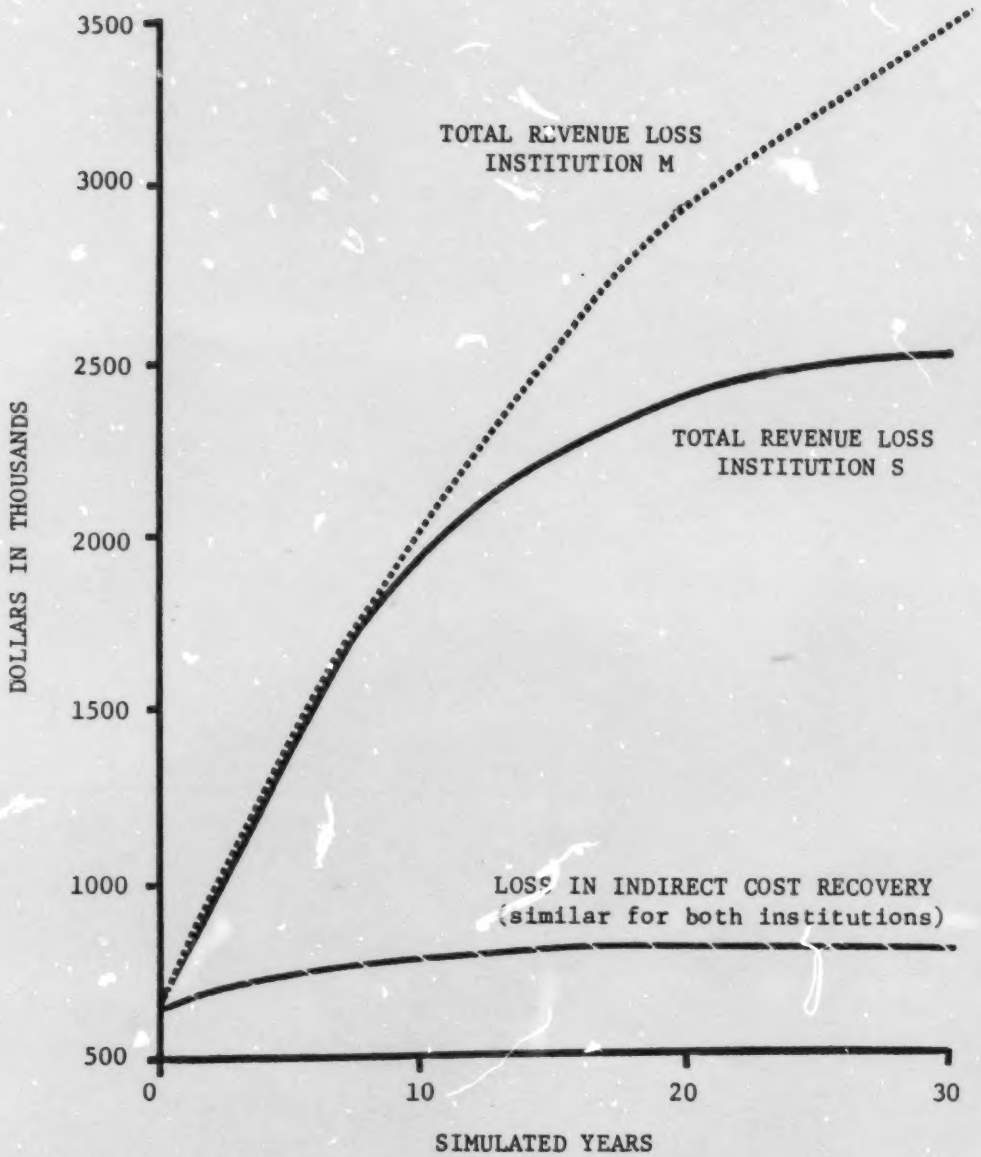

FIGURE 2. Changes in revenues resulting from a 10% loss in indirect cost recovery

faculty and staff and less plant and equipment, it will have reduced capability to attract research grants, students, and patients and thereby will experience an eventual total income reduction much larger than the initial indirect cost recovery reduction. In system dynamics concepts, this is an example of a positive feedback loop.

The basis of some of the proposals to reduce indirect cost recovery (for example, Brown, 1981) is to shift funds to direct research project support rather than to simply reduce the research component of the federal budget. To test the impact of this proposal on a typical research oriented academic medical center, the authors ran the simulated institutions with indirect cost recovery reduced by 10%, but with a like number of dollars added to direct research project support. This trade-off in income streams means that the institutions' total revenues at time zero are unaltered from the base case, however, as time goes by, the lack of general funds for facilities, equipment, and salary support (not covered by grants) again takes its toll in institutional viability. The net result is that the institutions still must retrench, but not as substantially as in the case when direct project support was not increased. For the stable institution, shrinkage in the institution is indicated by a reduction in total revenue of about $850,000 by year 30. Once again the decline is more substantial for the institution that is initially less solid financially, with total revenue losses reaching $1.6 million by year 30. Figure 3 displays these results.

Insert Figure 3 about here

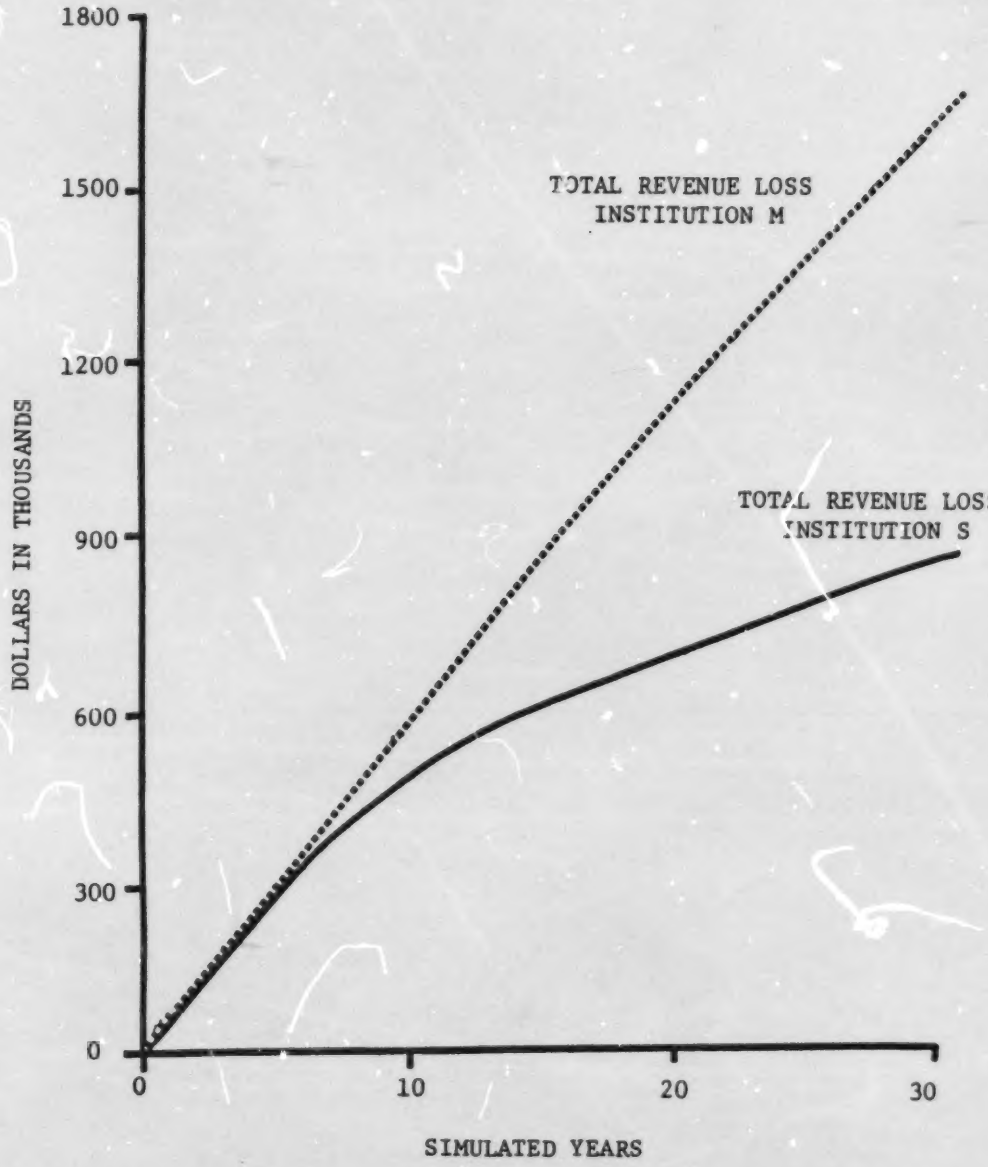

FIGURE 3. Changes in revenues resulting when the 10% loss in indirect cost recovery is recouped in direct expenses

Figure 4 compares the shrinkage after 20 years in indirect cost recovery, research direct funding, and total revenue for the scenario representing loss of indirect cost recovery, and the comparable situation with that loss returned as direct project support for Institution S. Figure 5 makes the same comparison for Institution M which started off in a more fiscally marginal position.

Insert Figures 4 and 5 about here

It is interesting to observe that although most of the initial income loss due to a reduction in indirect cost recovery occurs at the medical school, since it administers the grants in the simulated institutions, after the academic medical center adjusts to the loss over a period of years, significant shrinkage also occurs in the hospital and faculty medical practices. This is due to the intimate linkages and interdependencies between the components of the medical center. Figure 6 displays the percentage decline in operations after 20 years for each of the three organizational components of Institution S for both the indirect income loss only case, and the scenario where this income is recouped as direct project support.

Insert Figure 6 about here

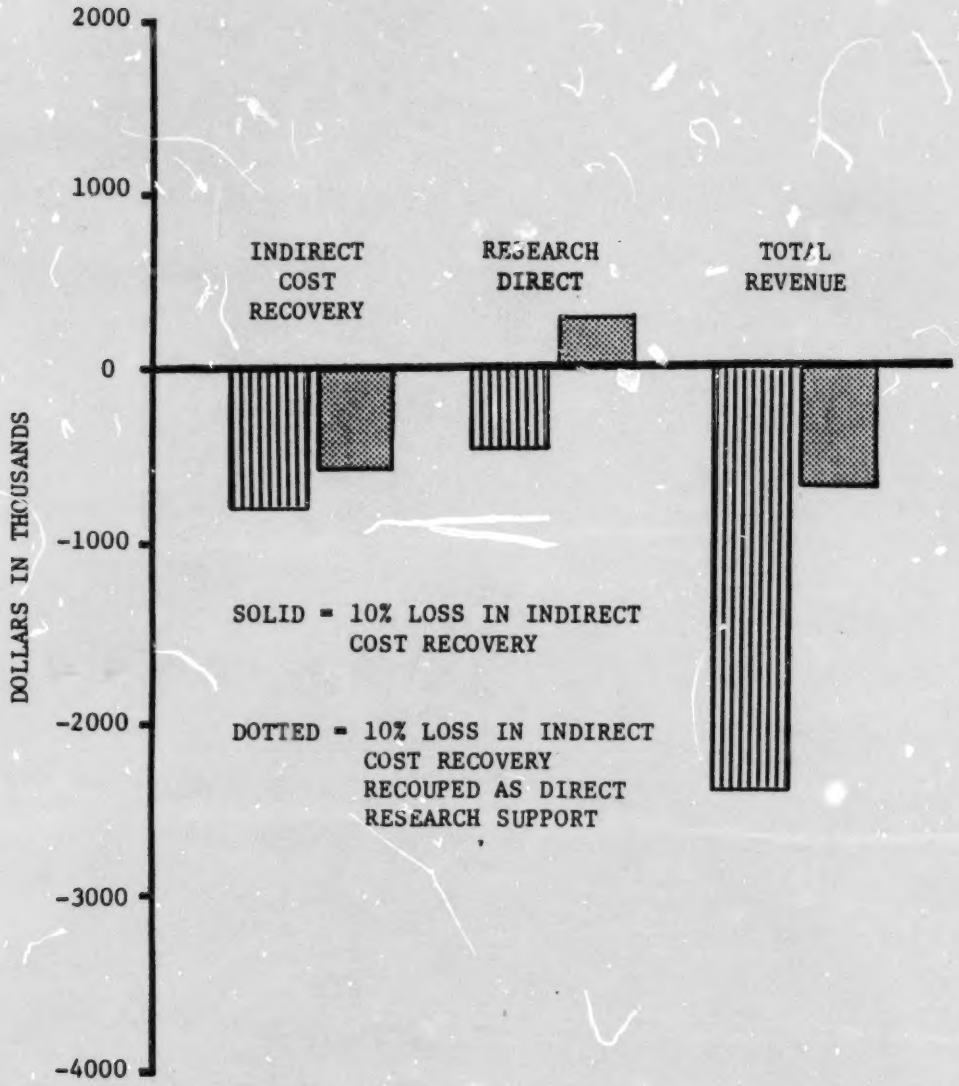

FIGURE 4. Annual change in income by source after 20 years - Institution S

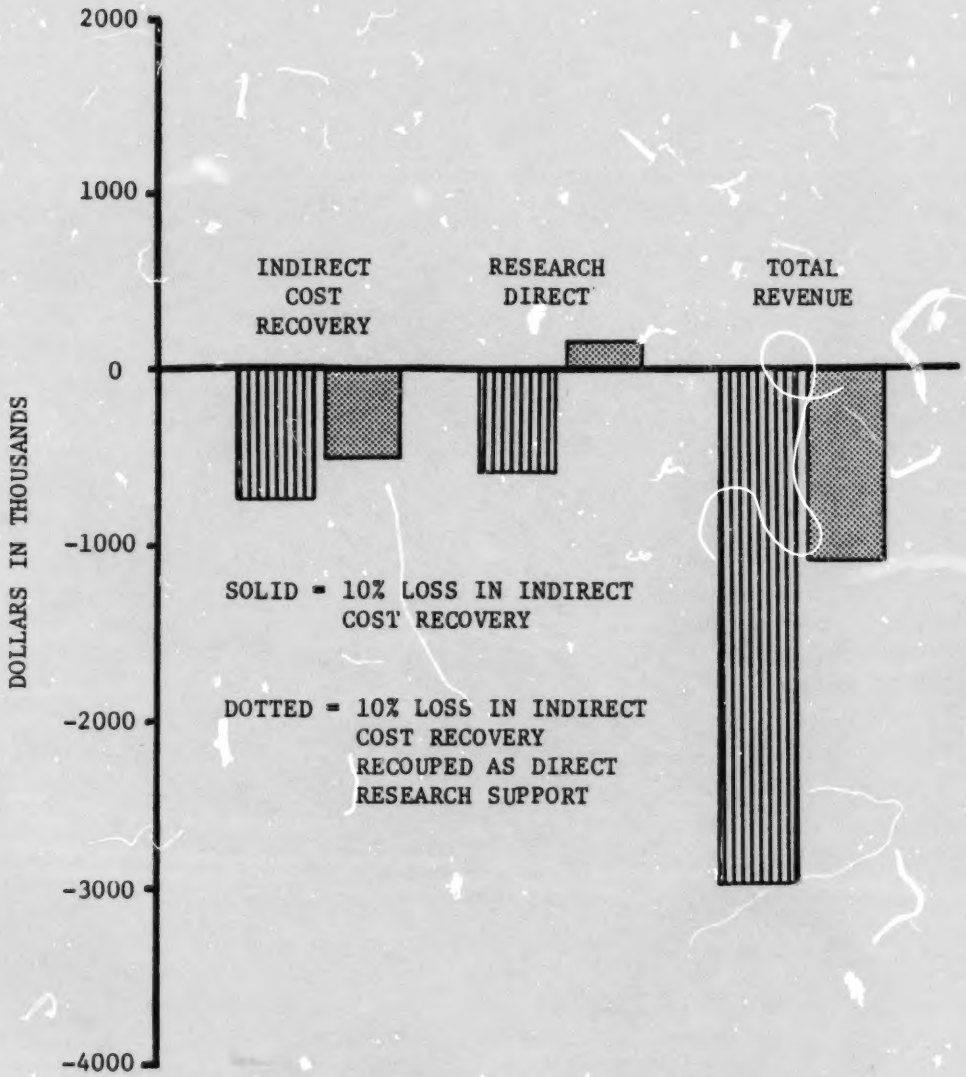

FIGURE 5. Annual change in income by source after 20 years - Institution M

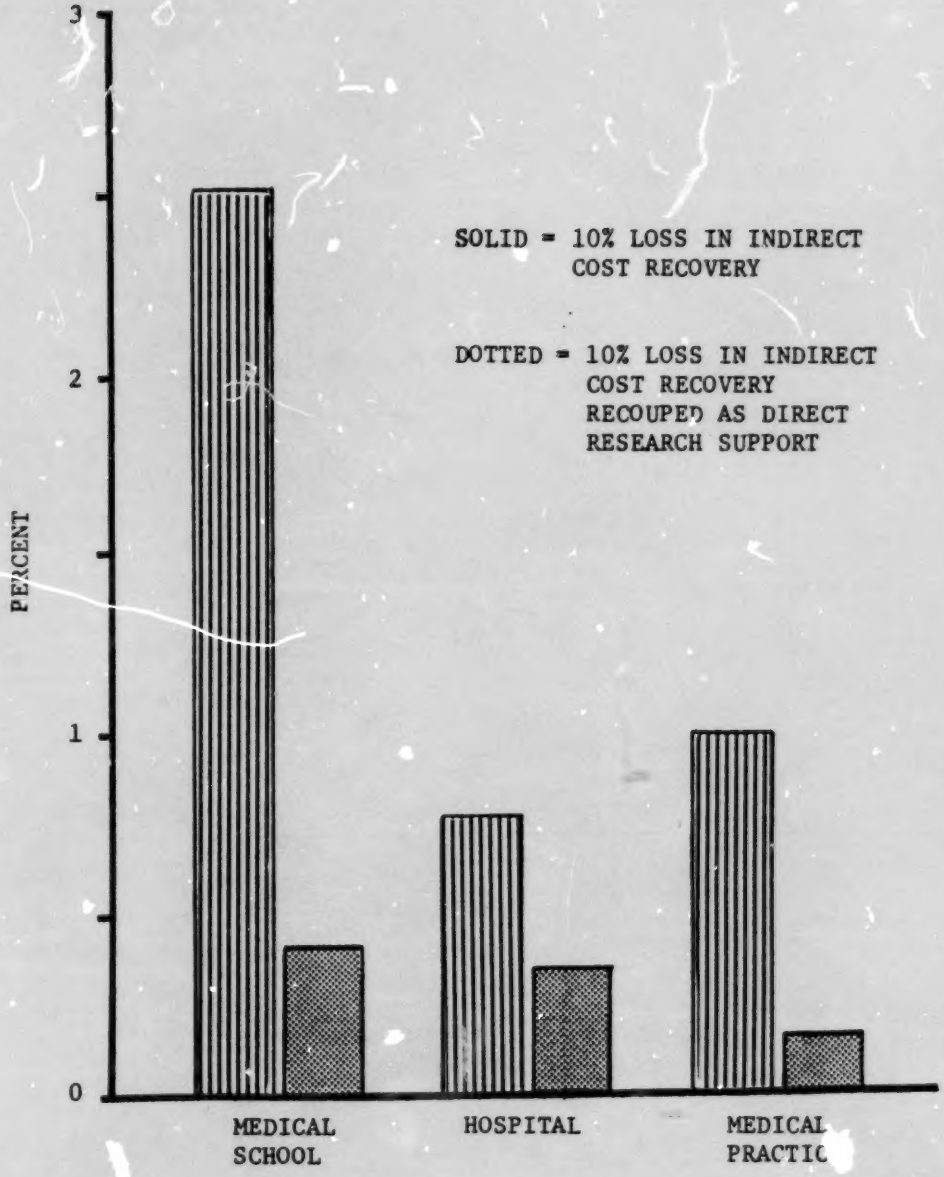

FIGURE 6. Level of annual operational reductions - Institution S

Conclusions

The results of the analyses indicate that an institution will most likely experience significant negative multiplier effects if indirect cost reimbursement is arbitrarily reduced. The long-term effect is that the size of the enterprise shrinks significantly due to the required diversion of resources, and clearly less total academic output is produced. This impact is significantly exaggerated if the institution is in marginal financial condition when the reduction occurs.

If the institution can recoup the lost resources in the form of direct project support (which would require successful competition in the grant marketplace), the negative impact is ameliorated somewhat; however, it is not eliminated, and declines of about one-half of the prior experience still pertain.

The Federation of American Societies for Experimental Biology Newsletter (1982,) asks the question, "Is the primary purpose of appropriations for research to support the largest number of top quality research ideas or to assure institutional stability" (p. 1), implying that indirect cost reimbursement should be reduced to provide more direct research grant funds. It appears from the analyses reported in this paper that the federal agencies do not have to agonize over that question. This research indicates that both objectives will be impeded if granting agencies do not reimburse institutions for an appropriate share of indirect costs which are associated with sponsored projects.

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